

(No Model.)

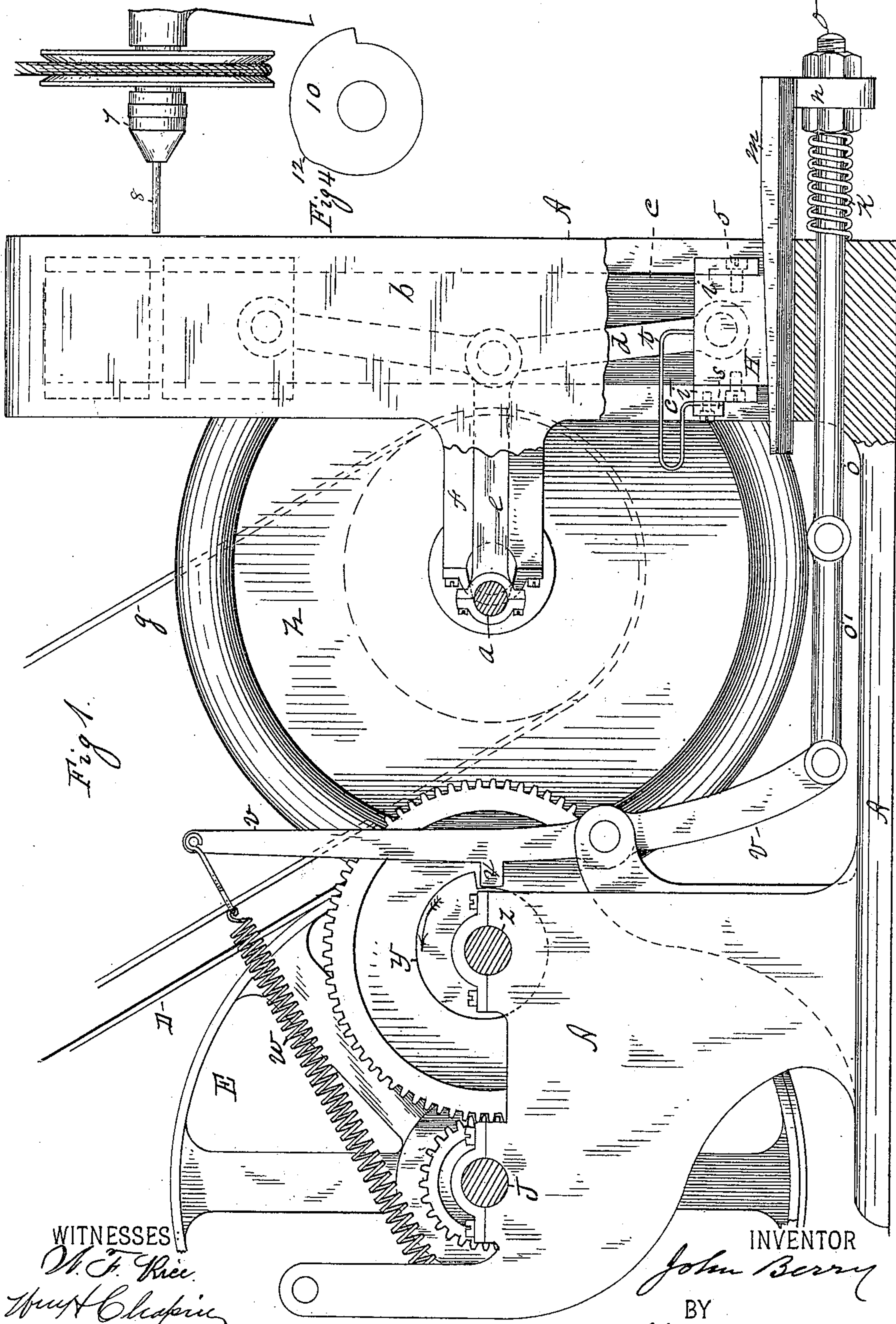
3 Sheets—Sheet 1.

J. BERRY.

MACHINE FOR SWAGING METAL BARS.

No. 337,297.

Patented Mar. 2, 1886.



WITNESSES:  
*W. F. Rice*  
*Wm. A. Chapin*

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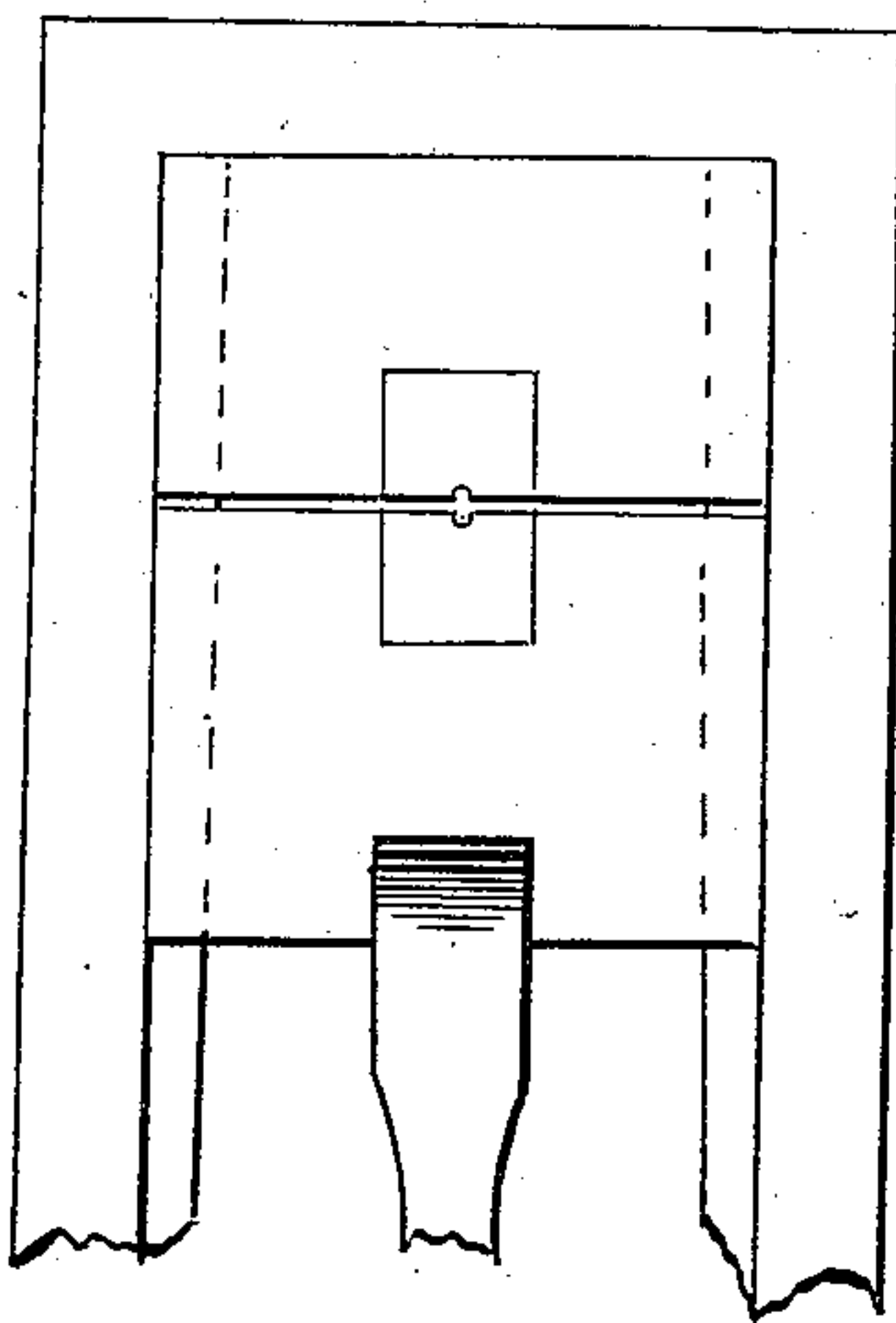
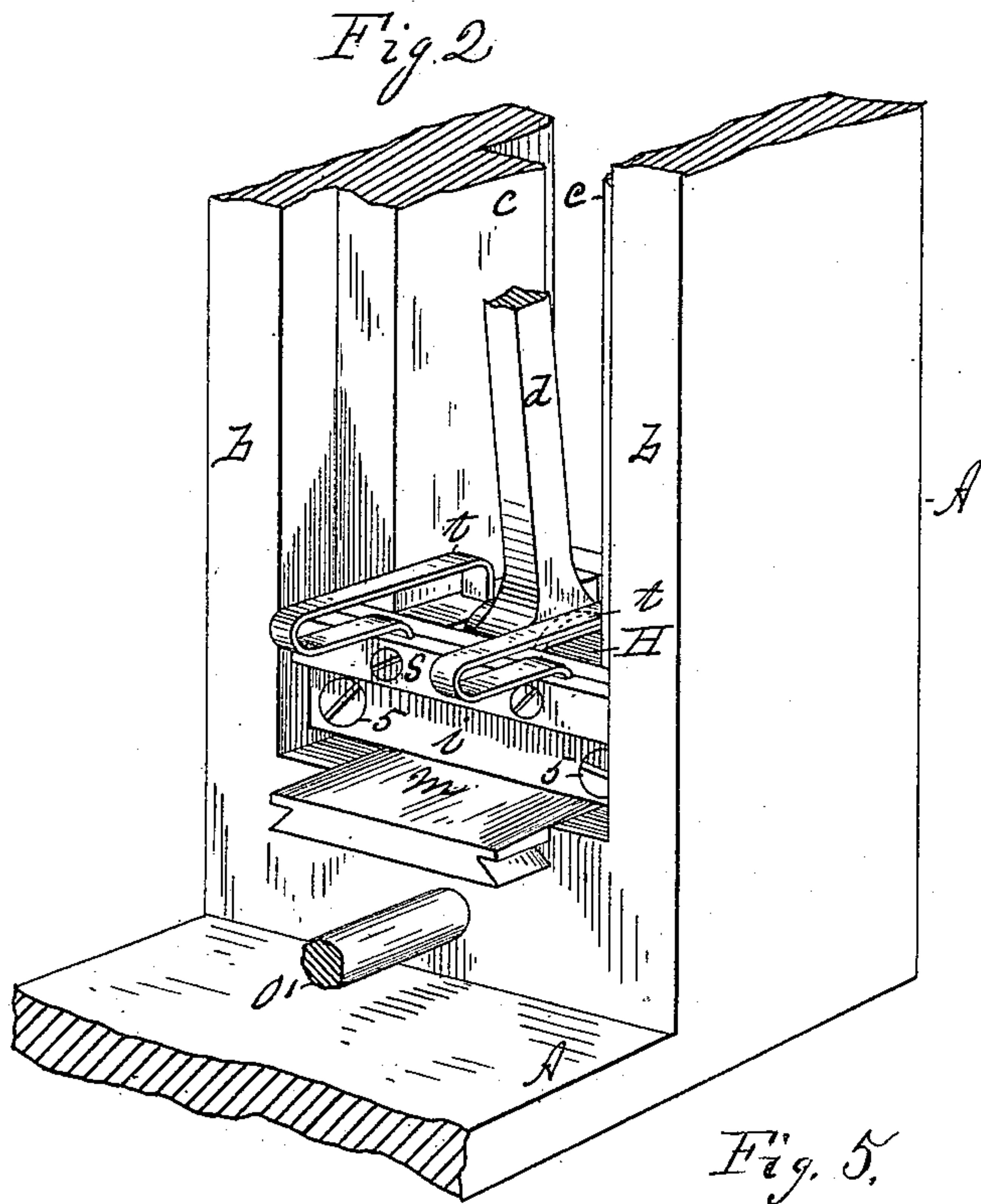
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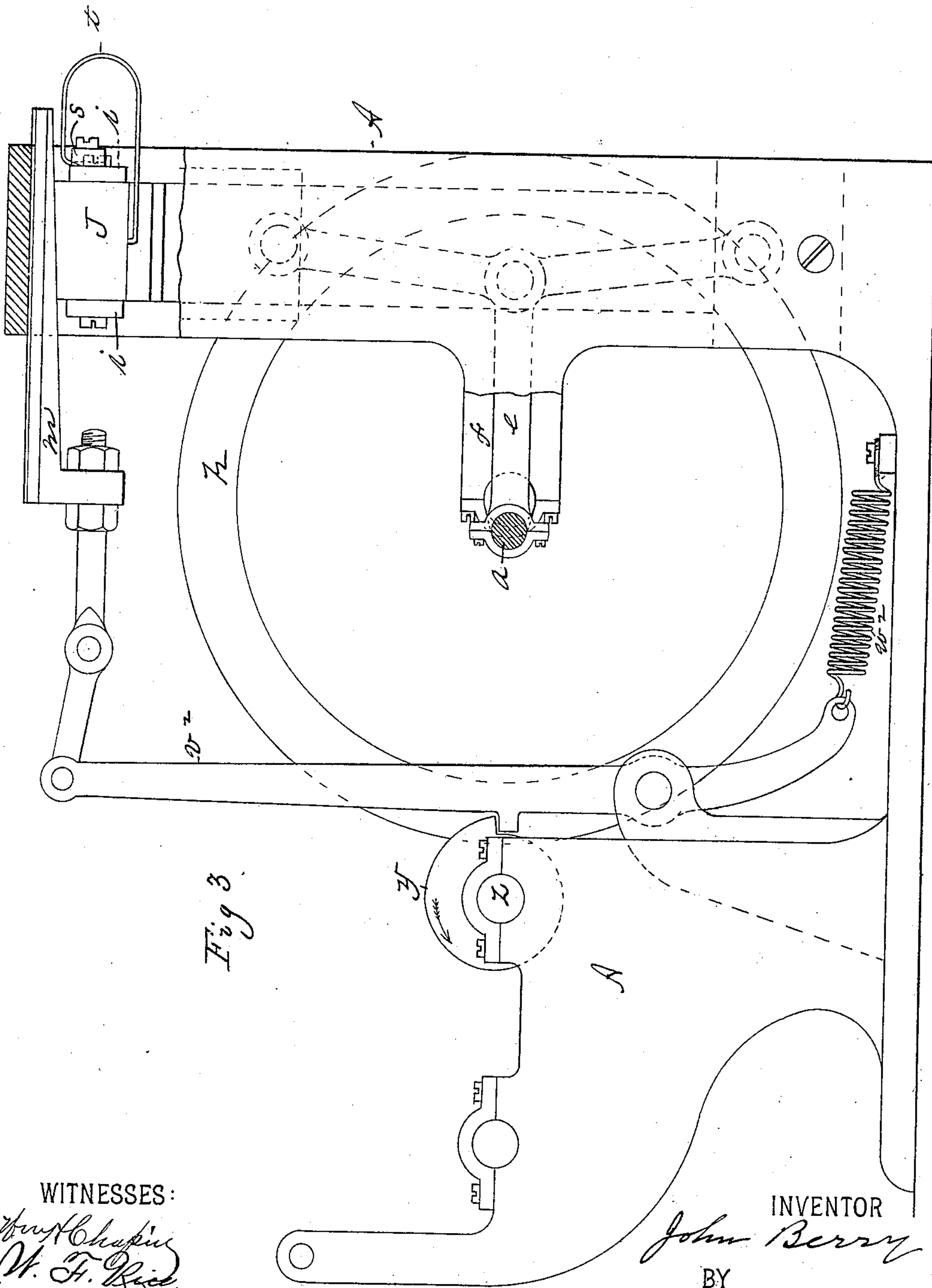


Fig. 3.

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# UNITED STATES PATENT OFFICE.

JOHN BERRY, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO THE  
NATIONAL NEEDLE COMPANY, OF SAME PLACE.

## MACHINE FOR SWAGING METAL BARS.

SPECIFICATION forming part of Letters Patent No. 337,297, dated March 2, 1886.

Application filed November 30, 1885. Serial No. 184,236. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN BERRY, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Machines for Swaging Metal Bars, of which the following is a specification.

This invention relates to improvements in machines for swaging or forging metal bars, which embody in their construction a die having a reciprocating motion opposite another die, which reciprocating die is given its motion by toggle-bar mechanism, said machines also embodying suitable mechanism for holding said bars between the dies while they are operated on by the latter, the general construction of said machines being shown in Patents No. 249,822, of 1881, No. 257,645, of 1882, and No. 280,682, of 1883, the object being to provide in the class of swaging-machines above referred to, and in any others to which the within-described improvements may be applicable, means for moving one of the dies toward and from the other die while the swaging of the bar is going on, independent of the toggle-bar mechanism, whereby one die gradually approaches the other while the bar is being swaged, and at the completion thereof is suddenly moved in the opposite direction and brought to a position to repeat said gradual movement toward the other die, thereby obviating the strain upon the swaging-machine and the dies consequent upon a movement of the die or dies toward each other sufficient to effect the entire degree of compression of the bar at once, and producing more uniform and better work.

A further object of this invention is to provide, by means of mechanism hereinafter described, for swaging metal rods between dies having parallel faces, but producing a swaged rod having a lesser diameter at one place thereon than elsewhere.

In the drawings forming part of this specification, Figure 1 is a side elevation, partly in section, of a portion of a needle-blank-swaging machine embodying my improvements, said figure showing a machine having a portion of its frame broken away on the side. Fig. 2 is a perspective view of a portion of said frame, showing therein parts of the

mechanism for regulating the position of said toggle-bar abutment or bearing-block. Fig. 4 is a side view of a cam used in the machine for swaging a bar having a greater diameter at one place than elsewhere. Fig. 3 is a similar view to Fig. 1, but showing a modified construction relative to the application of the means for moving one of the dies, as aforesaid, while the machine is in operation. Fig. 5 is a detail view of the swaging-dies, showing a portion of the guide-frame and one of the toggle-levers.

In the drawings, A is the frame of the machine, having the upright parts *b b*, on the inner sides of which are suitable ways, *c c*, with which the movable die engages, and by which the latter is guided in its reciprocating movements opposite the fixed die, the latter being suitably secured between the said parts *b b* at the upper end thereof. Said two dies are shown in dotted lines in Fig. 1, and they are arranged and operate substantially in the manner described in said patents—that is to say, two toggle-bars, *d*, are connected with and located between the movable die and an adjoining part of the frame A, and a connecting-rod, *e*, is attached to the toggle-joint of the bars *d* by one end, and its opposite end is attached to an eccentric on the shaft *a*, which runs in suitable bearings in arms *f*, (one of which only is shown in the drawings.) Said shaft *a* has thereon a balance-wheel, *h*, and a driving-pulley on which a belt, *g*, runs, whereby shaft *a* is given a rapid rotary motion and said movable die a reciprocating motion opposite the fixed die.

In many of the machines of this class heretofore made the end of one of the toggle-bars is pivoted directly to the frame of the machine or swings against a bearing thereon, which is rigid, so that the die which is attached to said bars has only a reciprocating movement proportionate to the extent of the vibratory motion of the toggle-bars at their joint, and always reciprocates at such a fixed distance from the other die as it may have been adjusted to through the said toggle-bearing. Another machine employs the toggle-levers in connection with the wedge, adjustable by a set-screw, to cause the dies to reciprocate at such a distance from each other as may be desirable;



but the herein-described improvements provide a movable bearing or abutment in the frame of the swaging-machines, against which one of the toggle bars or levers bears, or back  
 5 of the fixed die, and means for automatically imparting to said bearing or to said fixed die a movement whereby the dies perform their functions at variable distances from each other while operating to swage a bar.

10 In frame A, at the lower ends of the ways *c*, is placed the wedge *m*, having a species of tongue-and-groove connection with the frame, and adapted to slide to and fro in the latter while the machine is in operation, as below  
 15 described. The wedge *m* has a downhanging lip, *n*, on one end, which is perforated to receive the end of the connecting-rod *o*, the latter being secured to the wedge by nuts, as shown, or other suitable means. A spring,  
 20 *k*, is interposed between one of said nuts and the adjoining side of frame A, to aid in sliding the wedge in one direction. A short intermediate connecting-rod, *o'*, is pivotally connected to one end of rod *o*, and its oppo-  
 25 site end is pivoted to the lower end of the lever *v*, the latter being pivoted to a part of frame A or a suitable arm thereon, as shown. Lever *v* is provided with a projection, *x*, on its rear side, and its upper end is connected  
 30 by a spring, *w*, to the frame, whereby the lever is held against the face of the cam-wheel *y*, said projection *x* being its contact-point therewith. Said cam-wheel is fixed on a shaft, *z*, which is given a rotary motion in the direction of the arrow on the cam-wheel  
 35 by a gear-connection with the shaft J, as shown, the latter being driven by a belt, D, running on the pulley E, which is fixed on said shaft.

40 By means of the lever *v* and its connection with the wedge *m*, as described, and the cam-wheel *y*, said wedge is given an inward motion in the frame A; and when wheel *y* has turned to the position shown in Fig. 1, there-  
 45 by letting the projection *x* on the lever drop from the higher onto the lower part of the face of the cam-wheel, the lever swings, under the combined action of the springs *w* and *k*, and the wedge *m* is moved with a quick mo-  
 50 tion outward in the frame or to the position shown. The movement of the wedge *m* is so timed that the extent of its said inward movement occurs while the dies are acting to reduce a needle-blank or bar, and immediately  
 55 that said reduction is accomplished the wedge is suddenly drawn outward, as set forth.

The aforesaid movable bearing or abutment for one of the toggle-bars *d* consists of the block H, in which the end of said bar is piv-  
 60 oted, resting in a suitable socket or recess in the upper side thereof, as shown in Figs. 1 and 2. Said block fills the space between the faces of the ways *c c*, and has a vertical movement between them. The under side of  
 65 block H is inclined to correspond with the upper side of the wedge *m*, on which it rests, as shown.

To prevent said block from moving laterally between the faces of the ways *c*, a plate, *i*, is secured against the edges of said ways by  
 70 screws 5 on opposite sides of said block, and the aforesaid movement of the latter is within the chamber formed by the faces of said ways and the inner sides of the plates *i*.

To aid in keeping the block H always  
 75 against the wedge *m*, the springs *tt* are attached to one of plates *i* by the plate *s*, as shown, and their free ends bear against the top of block H, each side of the toggle-bar *d*.

In Fig. 1 is shown a portion of the rotating  
 80 blank-carrying spindle 7, whose construction and operation are fully set forth in said patents. A needle-blank, 8, is shown projecting from the end of said spindle.

The operation of the above-described im-  
 85 provements is as follows: The rotary motion of the shaft *a* is very rapid, causing the aforesaid reciprocating motion of the die which is attached to one of bars *d* opposite the fixed die, both of said dies being suitably grooved  
 90 to give the requisite cylindrical form to the swaged piece or bar. The blank 8, held by the spindle 7, is by the latter rotated and at the same time carried endwise between said dies, and when the end of the blank is enter-  
 95 ing therebetween the inward movement of the wedge *m* begins, the latter having, at this stage of the operation, the position shown in Fig. 1, the block H being at its lowest position, there-  
 100 by reducing the movement of the die carried by the bars *d* toward the axis of the blank to its minimum; but gradually as the blank enters more and more between the dies the wedge  
 105 *m* advances, and the movement of said die toward the axis of the blank is augmented until the full reduction is accomplished, when it is withdrawn by the spindle 7, and at the same  
 110 time lever *v* drops off from the high face of cam *y*, as aforesaid, letting the wedge *m* be withdrawn to its starting position, as before.

By means of the gradual movement of one die toward the other, as aforesaid, while its swaging or compressing movements are kept up, the action of the dies upon the blank or  
 115 bar which is being formed is so gradual that the strain upon the machine is much reduced and the swaged bar is made comparatively free from imperfections.

The starting position of the movable die, which needs to be varied according to the di-  
 120 ameter of the bar to be swaged, is determined by sliding the wedge *m* under block H to the requisite position by means of the nuts on rod *o*, and then by the same means securing it on the latter.

In forging or swaging some classes of work it is desirable that, coupled with the above-described means for the gradual reduction of metal bars by dies, when worked either cold or  
 130 hot, at a certain point on the bar the diameter be reduced to a smaller one than elsewhere thereon, and to effect said result a cam-wheel, 10, Fig. 4, is employed, having a pro-  
 135 jection, 12, on its face, in place of the cam-



wheel *y*. The action of the cam-wheel 10, in connection with the lever *v* and the wedge *m*, is such that when the projection 12 is brought against the lever the wedge suddenly slides inwardly, lifting block H, and causing the movable die to act nearer the face of the fixed die, thus reducing the part of the bar acted on while the dies are in this position more than that part thereof was reduced before said contact of projection 12 with lever *v*, it being understood that said bar while being reduced is given an endwise motion, as aforesaid.

It is obvious that it is not essential to the operation of the above-described improvements that the metal bar to be reduced be held and moved by the spindle 7; but it may be held and guided by the hand of a competent operator.

The modified construction shown in Fig. 3, in which the upper die, J, which is shown in dotted lines in Fig. 1, is shown therein in full lines, illustrates means for moving said die which is substantially the same as that employed in the construction shown in Fig. 1 for moving the bearing-block H.

In order to attain the object of this invention it is not essential whether the said die or the said bearing-block has its position changed as above described, whereby one die is made to approach and recede from the other during the swaging operation, having a movement therefor independent of the swaging motion proper.

In Fig. 3, as shown by the dotted lines therein, the toggle-bar *d* has its lower end resting on a bearing which is fixed to the frame A. The upper die, J, is secured between the ways in frame A and the plates *i i* in substantially the same manner as the block H is secured in Fig. 1, the spring *t* being applied to bear under said die to hold it against the side of wedge *m*, which, in said modified construction, is located between die J and the upper part of frame A, said wedge constituting, in the several herein-described constructions, a movable backing or support interposed between the die which is unconnected with the toggle mechanism and the frame, or, between the latter and the abutment, bridge, or block on which one end of the toggle bar or lever oscillates, and which receives the end-thrust of said bar or lever which is caused by the swaging action of the die or dies as they move against the bar which is being reduced.

In Fig. 3 the wedge *m* is operated by the lever *v*<sup>2</sup>, spring *w*<sup>2</sup>, and the rotating cam-wheel *y*, whereby the wedge is given the same motions as are imparted to that element in Fig. 1 by the mechanism there shown, and above described.

What I claim as my invention is—

1. In a swaging-machine, substantially as described, having a movable die operated by toggle-bar mechanism, a movable backing or support, substantially as described, interposed between the abutment of said toggle-bar mechanism and the frame of the machine, and

mechanism, substantially as described, for imparting motion to said backing or support, whereby said die is caused to move independent of its swaging motion toward and from the other die of the machine during the operation of swaging, combined and operating substantially as set forth.

2. In a swaging-machine, substantially as described, having a movable die operated by toggle-bar mechanism, and a die connected to the frame of the machine, a movable backing or support, substantially as described, interposed between said frame and the die connected therewith, and mechanism, substantially as described, for imparting motion to said backing or support, whereby said last-named die is given a motion toward and from said movable die during the operation of swaging, combined and operating substantially as set forth.

3. The combination, with the movable die and the vibrating toggle-jointed bars of a swaging-machine, substantially as described, of a movable bearing-block connected to the end of one of said bars and forming its abutment, a sliding wedge upon which said block rests, and mechanism, substantially as described, for imparting a sliding motion to said wedge, substantially as set forth.

4. The combination, with the movable die and the vibratory toggle-jointed bars of a swaging-machine, substantially as described, of a movable bearing-block connected to the end of one of said bars and forming its abutment, two springs secured by one end thereof by the side of said bearing-block and having their free ends resting on the latter, a sliding wedge upon which said block rests, and mechanism, substantially as described, for imparting a sliding motion to said wedge, substantially as set forth.

5. The combination, with the movable die and the vibratory toggle-jointed bars of a swaging-machine, substantially as described, of a movable bearing-block connected to the end of one of said bars and forming its abutment, a sliding wedge upon which said block rests, the connecting-rod *o*, having an adjustable connection with said wedge, the cam-wheel *y*, the lever *v*, having a pivotal connection with said rod, and a spring to swing said lever against said cam-wheel, substantially as set forth.

6. The combination, with the movable die and the vibratory toggle-jointed bars of a swaging-machine, substantially as described, of a movable bearing-block connected to the end of one of said bars and forming its abutment, a sliding wedge upon which said block rests, the connecting-rod *o*, having an adjustable connection with said wedge, a cam-wheel having a projection on its face between the terminating points of its higher and lower surfaces, the lever *v*, having a pivotal connection with said rod, and a spring to swing said lever against said cam-wheel, substantially as set forth.



7. In a swaging machine, substantially as described, having a movable die operated by a toggle-bar, a sliding wedge operating against the abutment of said bar to impart a  
5 motion to said abutment while the die is in operation, and means, substantially as described, for imparting a sliding motion to said wedge, combined and operating substantially as set forth.

10 8. In a swaging-machine, substantially as described, having a movable die operated by a toggle-bar, and a die attached to the frame

of the machine, a sliding wedge operating between the latter die and said frame to impart a motion to said die while said movable die 15 is in operation, and means, substantially as described, for imparting a sliding motion to said wedge, combined and operating substantially as set forth.

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Witnesses:

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W. F. RICE.